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12

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SERVICE ON PLANT DISEASES AND PESTS

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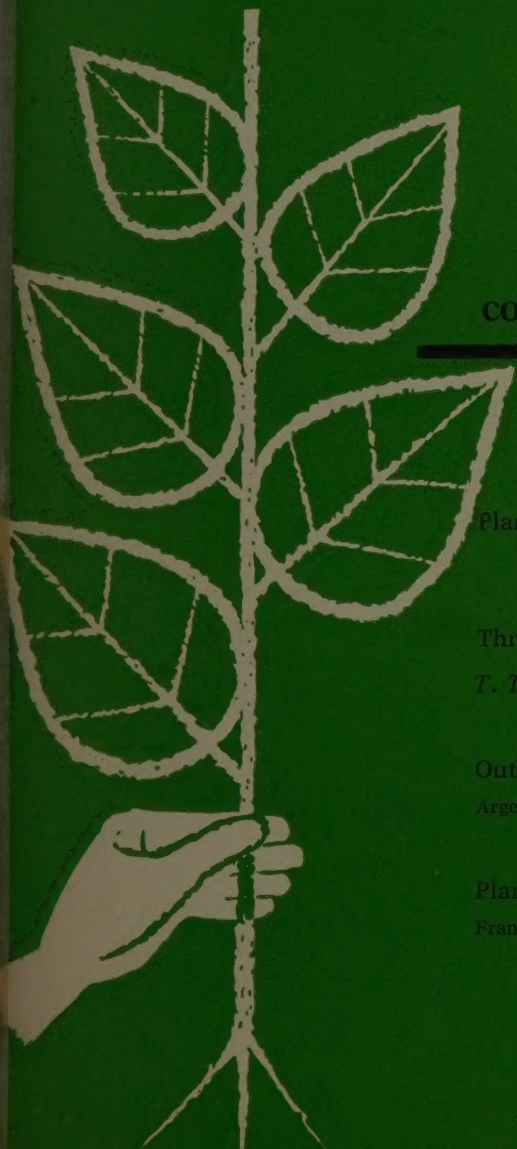
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FAO PLANT PROTECTION BULLETIN

is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information. No responsibility is assumed by FAO for opinions and viewpoints expressed in the Bulletin.

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GRASSES IN AGRICULTURE

Agricultural Study No. 42

A global review of the adaptation, management, improvement and utilization of cultivated grasses in dryland and irrigated agriculture, this authoritative volume is based on information supplied by technicians from all parts of the world and on the wide personal experience of its authors. It indicates some problems of present concern to grass specialists and describes the methods being adopted to overcome them.

The agronomy of grasses is discussed in its relation to farm planning, soil fertility, land preparation, grazing, artificial fertilizers, and the production and distribution of seed. Biology, genera and species of grasses are also reviewed in some detail, including the physiology and local adaptation of grasses, plant introduction, selection and breeding, as well as the distribution and agricultural value of certain species.

In addition to numerous references for further reading on the subject of grass agronomy, this publication includes a full glossary of bibliographical titles and an index of subject and botanical names. A table of conversion factors also appears for reader reference.

(in preparation)

FAO PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

Plant-feeding Mites of Cyprus¹

George P. Georgioui,² University of California Citrus Experiment Station, Riverside

The records and field notes reported in this paper were collected by the writer during the period 1953-57, when he was serving as entomologist with the Department of Agriculture, Cyprus. Previous information on the mites of Cyprus is very scanty, and it appears from this and from information received from growers that mites were of little economic importance in pre-war years. Morris (10) in 1937 listed only five species of Acarina in Cyprus, all in the family Eriophyidae, and he (9) also reported occasional damage to citrus by "red mite" only in 1938 and 1941.

Since the Second World War, mite injury has become more common, and mites may now be rated among the most important agricultural pests. This paper lists 35 species of mites from Cyprus, belonging to seven families of Acarina. Serious mite outbreaks are recorded on at least 13 agricultural crops, as shown in the Appendix. Mites of the families Tenuipalpidae, Tetranychidae, and Eriophyidae are the most destructive. Of the various crops, citrus and apple are the ones most seriously and consistently infested.

Tenuipalpidae

1. *Cenopalpus pulcher* (Canestrini & Fanzago)
= *Brevipalpus geisenheyneri* Baker & Pritchard; not Rübsaamen

This mite was first collected in Cyprus in 1952 and has since been observed to cause considerable damage to apple trees. Extremely high populations were noted in foothill areas at elevations from 2,000 to 4,000 feet during August 1956. The mites were less abundant on quince, loquat and poplar. Overwintering populations were observed in groups on twigs, especially just below the buds.

Known hosts in Cyprus: *Cydonia*³ *vulgaris*, *Eriobotrya japonica*, *Populus** *alba*, *Pyrus malus*.

2. *Cenopalpus lanceolatisetae* (Attiah)

Small numbers of mites belonging to this species were collected on apple in 1957. They agree with Attiah's (1) description of the species in having the marginal setae of the body and the extra seta broadly lanceolate and serrate. This is the first record of this mite outside Egypt. The species appears to be much less common than *Cenopalpus pulcher*, and so far it has not been observed to cause economic damage.

Known host in Cyprus: *Pyrus malus*.

¹ Paper No. 1146, University of California Citrus Experiment Station, Riverside, California.

² The writer is grateful to Mr. Donald Macfarlane of the British Museum (Natural History), London, who identified many of the mites listed in this paper. He wishes to express his appreciation to Mr. H. H. Keifer of the California Department of Agriculture, Sacramento, who identified some of the Eriophyidae, and Dr. A. E. Pritchard of the University of California, Berkeley, under whose guidance he identified the remaining mites.

³ The asterisk (*) indicates new host genera in addition to those listed by Pritchard & Baker (16).

3. *Brevipalpus obovatus* Donnadieu
= *Brevipalpus inornatus* (Banks)

This mite has been found in large numbers mainly on ornamentals but has also been collected on citrus and grapevines. The mites were most abundant in spring and autumn, the population declining considerably during the summer.

Known hosts in Cyprus: *Althea rosea*, *Antirrhinum* majus*, *Aster* sp.*, *Chrysanthemum indicum*, *Citrus* spp., *Dahlia* sp.*, *Gaillardia* sp.*, *Geranium sp.*, *Scabiosa* prolifera*, *Verbena* sp.*, *Vitis* vinifera*, *Zinnia* elegans*.

4. *Brevipalpus californicus* (Banks)
= *Brevipalpus australis* (Tucker)

This species has been collected only once, on orange fruit in 1956. The population was very low and no economic damage was observed.

Known host in Cyprus: *Citrus sinensis*.

Tetranychidae

5. *Bryobia praetiosa* Koch complex

High populations of this mite have been recorded on apple and other fruit trees since 1954. However, the species may have existed in Cyprus at least as early as 1950 when egg masses, probably belonging to this species, were first reported on apple branches. The mite has also been collected on a number of herbaceous plants far from fruit trees. Owing to the lack of a sufficient number of larval forms in the material studied, it has not been possible to determine whether both forms of this species complex (*B. praetiosa* Koch and *B. arborea* Morgan and Anderson), as distinguished by Morgan and Anderson (8), exist in Cyprus. It should be noted, however, that the mite has so far been collected in mountain areas at elevations from 2,000 to 4,000 feet only on fruit trees, and in the plains only on herbaceous plants.

Known hosts in Cyprus: *Prunus amygdalus*, *Pyrus communis*, *Pyrus malus*, *Althea rosea*, *Circium sp.*, *Galium sp.*, *Geranium sp.*, *Malva parviflora*, *Medicago denticulata*, *Urospermum sp.*

6. *Tetranychus telarius* (Linnaeus) complex

Serious outbreaks of this mite have occurred since 1954 on white beans and watermelon, and to a lesser extent on plum, apple, and nectarine. This is the mite most commonly encountered in Cyprus and most injurious to vegetable crops.

Known hosts in Cyprus: *Citrullus vulgaris*, *Fragaria vesca*, *Ipomoea sp.*, *Jasminum sambac*, *Luffa aegyptiaca*, *Lycopersicum esculentum*, *Malva parviflora*, *Mercurialis sp.*, *Phaseolus vulgaris*, *Prunus domestica*, *Pyrus malus*, *Sonchus sp.*

7. *Tetranychus sp.*

This mite was collected recently on *Mesembryanthemum sp.* and *Lactuca sp.* On these plants it was found to be very abundant, but it has not yet been observed on agricultural crops.

The aedeagus of this species somewhat resembles that of *Tetranychus turkestani* Ugarov and Mikolsky, as redescribed by Wainstein (18), and also that of *T. atlanticus* McGregor. Additional studies are needed before a definite identification can be made.

8. *Eutetranychus orientalis* (Klein)
= *Anychus orientalis* Klein
= *Eutetranychus banksi* Pritchard & Baker in part; not McGregor

This mite was collected in Cyprus in 1951 but had probably existed there earlier. Klein (4) presumed it to exist in Cyprus in 1938, and Morris' reports of damage to citrus by "red spider" in 1938 and 1941 probably concerned this species (9). Serious outbreaks of *E. orientalis* on citrus were observed in 1956 and 1957. Damage consisted of characteristic fine leaf stippling and silvering, and, to a lesser extent, of fruit russeting and leaf drop. The mite has also been found on other plants grown in close proximity to citrus. In a mixed citrus grove the mites were more abundant on lemon trees than on Shamouti orange, sour orange, or tangerine.

Known hosts in Cyprus: *Citrus sp.*, *Cucurbita pepo*, *Ficus carica*, *Juglans regia*.

9. *Eotetranychus hirsti* Pritchard & Baker

This species was collected on fig in 1955. It agrees with material from Coimbatore and Ban-

galore, India, the only other country in which this species is known to exist (15). Fig is the only reported host of this species. No appreciable damage due to this mite has been observed in Cyprus.

10. *Eotetranychus pruni* (Oudemans)
= *Eotetranychus pomi* Sepasgosarian

The material studied agrees with Sepasgosarian's (17) description of *Eotetranychus pomi*. It also agrees with Oudemans' (13) type of *E. pruni* (A. E. Pritchard in personal communication). This mite was first collected in Cyprus on cherry and apple in 1955. No appreciable damage was observed, but the mite has since been encountered frequently at elevations of 3,000 to 4,000 feet and may be a potentially serious pest. It has been reported as a serious pest of apple in Germany (17).

Known hosts in Cyprus: *Prunus cerasus*, *Pyrus malus*.

Eupodidae

11. *Penthaleus major* (Dugès)

This species was collected on wheat and barley in 1957. Heavily infested plants extending over an area of about 5 square miles had assumed a silvery, chlorotic appearance. The mite has also been observed to feed on several weed species in the same area.

Known hosts in Cyprus: *Hordeum* spp., *Triticum* spp.

Tydeidae

12. *Tydeus* spp.

Mites belonging to this genus were collected in Cyprus on apple, citrus, and plum trees. In some cases, particularly on citrus, the population was high but no injury was noted.

Ceratozetidae

13. *Humeroabates rostrrolamellatus* Grandjean

This species was observed in large numbers on trunks of a few grapefruit trees in 1954. A rather

high population was also found on grapefruit foliage in a different area but no damage was observed in either case.

Eriophyidae

14. *Aceria erineae* (Nalepa)

Morris (10) reported that *Eriophyes* sp. attacks walnut trees in Cyprus, producing numerous patches of matted hairs on the leaves. This type of injury occurs commonly in Cyprus, but is not considered of great economic importance. Specimens of mites collected from infested leaves in 1954 were identified as *Aceria erineae* (Nalepa).

15. *Aceria granati* (Canestrini and Massalongo)

This mite was reported by Morris (9) to have been very abundant on pomegranate in 1928-30 and to have caused considerable defoliation. No further outbreaks have since been observed.

16. *Aceria lycopersici* (Wolffenstein)

Morris (10) reported damage to potato leaves in Cyprus caused by *Eriophyes cladophthirus* (Nalepa). This species was later shown by Lamb (5, 6) to be a synonym of *Aceria lycopersici* (Wolff.), the tomato erineum mite. Morris' record of injury to potato leaves by this mite appears to be the only one in literature. The common host of this species is *Solanum dulcamara* (5).

No damage due to this mite has been noted in Cyprus in recent years.

17. *Aceria olea* (Nalepa)

Nalepa described this species from material collected in Cyprus in 1901 (12). The mite produces water-soaked areas, distortion and blistering of young olive leaves, and russetting and malformation of the fruit, especially in the stem-end area. The author estimated that malformed fruit due to this mite exceeded 46 per cent in certain areas of Cyprus in 1954 (3).

18. *Aceria* sp. (?) *pistaciae* (Nalepa)

This mite was first collected in Cyprus in 1956. It caused considerable distortion of leaves

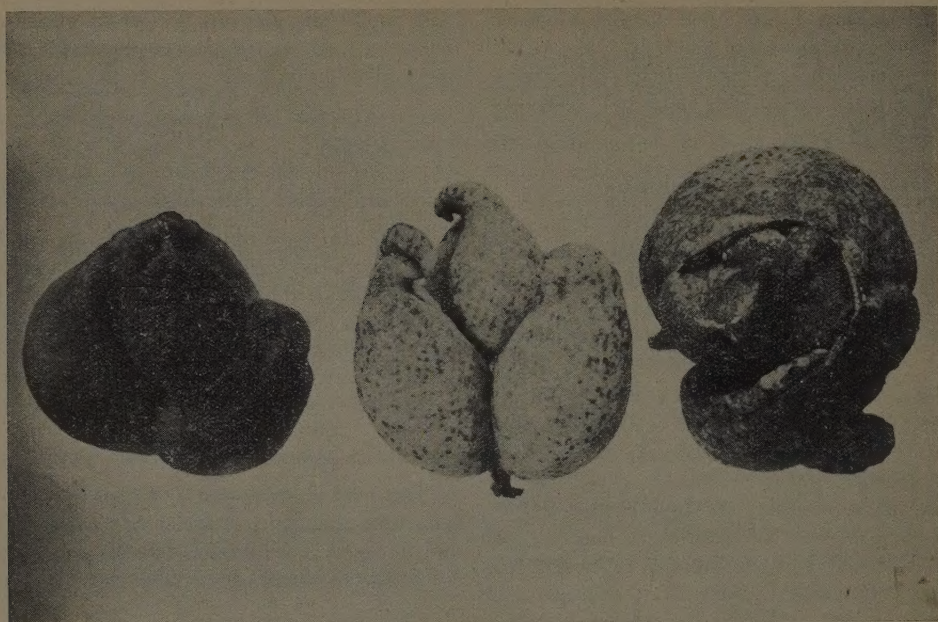


Figure 1. Lemons distorted by the citrus bud mite, *Aceria sheldoni* (Ewing), and heavily infested by California red scale, *Aonidiella aurantii* (Maskell).

of *Pistacia terbinthus* seedlings in two different localities.

19. *Aceria sheldoni* (Ewing)

The citrus bud mite, *A. sheldoni* (Ewing), is the most important pest of lemons in the northern coastal zone of Cyprus. It is also common on lemon in all other areas, particularly in home gardens where no oil sprays are applied against scale insects. It damages the buds and causes malformation of leaves, blossoms and fruit (Figure 1). *A. sheldoni* has also been observed on Valencia orange and bitter orange trees in Cyprus.

20. *Aceria georghioui* Keifer

This mite was collected in 1955 within the new shoots and between the bases of the leaves and stems of carnation plants. It caused distortion and stunting of leaves and shoots resembling that described by Pritchard (14) for *Aceria pa-radianthi* Keifer.

21. *Eriophyes pyri* (Pagenstecher)

This mite was reported by Morris (10) to cause damage to buds of apple trees.

22. *Eriophyes stephani* Nalepa

Cecconi (2) collected this mite in Cyprus on *Pistacia lentiscus* in 1901. He reported it as causing rolling of young leaves.

23. *Eriophyes syriacus* Fokeu

This mite was reported by Cecconi (2) on *Salicornis fruticosa*.

24. *Eriophyes vitis* (Pagenstecher)

This species occurs widely in Cyprus and produces erineae on the undersurface of leaves. The erineae are whitish at first, becoming reddish brown later in the season. This mite is probably not of much economic importance, except when preventing the normal development of young leaves on newly established vine cuttings. "Eri-

nose" of grape vines was reported in Cyprus as early as 1892 by Mouillefert (11).⁴

25. *Phyllocoptruta oleivora* (Ashmead)

The citrus rust mite, *P. oleivora* (Ashmead) appeared in Cyprus in 1941, according to Littlejohn (7), and by 1945 it was present in all the main citrus-growing areas of the island (9). It is now rated, together with the red scale, *Aonidiella aurantii* (Maskell), as the most important pest of citrus, especially in the eastern and southern coastal areas. Its incidence is sporadic in the interior and rare in the lemon-growing areas of the northern coast, where *Aceria sheldoni* (Ewing) is the prevalent species.

Observations on the phenology of *Phyllocoptruta oleivora* (Ashmead) were carried out in Famagusta during the period 1954-55. Mites on 12 different species or varieties of citrus were counted monthly. Four leaves were collected from each of the four quarters of each tree, and all mites present within two 20 microscope fields on the lower surface of each leaf were counted. The average number of mites counted per tree is shown in Table 1. Lemon trees supported the highest population and this population decreased in the following order: Valencia orange, Shamouti orange, bitter orange, grapefruit and tangerines.

The mite population was found to be extremely low during the winter. Hardly any mites were observed from December to April. A definite increase began in early May and a peak was reached in early July. High populations were maintained through mid-October. During this period, there appeared to be a progressive migration of the mites from the foliage to the fruit. The population declined sharply with the onset of cold weather in November. In some commercial groves, however, a high population persisted through mid-January. This was especially the case near windbreaks, in groves which did not receive a late treatment for mite control,

TABLE 1. — *Relative abundance of the citrus rust mite, Phyllocoptruta oleivora* (Ashmead), on citrus trees in Famagusta, Cyprus, 1954-55

Kind of citrus ^a	Number of mites ^b
Rough lemon	1 061
Sweet lemon	922
Sour lemon	660
Valencia orange	493
Sweet orange *	227
Asimika orange *	208
Bitter orange	171
Grapefruit	160
Blood orange *	144
Round orange *	133
Clementine tangerine	110
Rough bitter orange *	52

* Asterisk indicates local common name.

^b Total of 24 monthly counts on 16 leaves per tree.

and in situations where the fruit had not been picked by January. It was also observed that late infestations on ripe fruit did not produce the characteristic dark brown areas (Figure 2) but rather a general silvery coloration. Late-season populations were difficult to control with sulfur, apparently because of the prevailing low temperatures.

26. *Phytoptus avellanae* Nalepa

This mite occurs commonly on hazelnut (*Corylus avellana*), causing distortion and a very pronounced enlargement of floral parts, which often assume a pinkish coloration. Heavily infested blossoms fail to set fruit.

27. *Vasates lycopersici* (Masse)

This mite was first recorded in Cyprus on tomato plants in 1955. During that year it was found to be very abundant in several areas of the island and to cause russetting and drying of foliage, in some cases killing the entire plant. In

⁴Morris (20) reported the existence of *Calepitrimerus vitis* (Nalepa) (= *Phyllocoptes vitis* Nalepa) in Cyprus. However, he referred to the type of injury produced as "erinoe," and the symptoms he described resemble closely those of *Eriophyes vitis* (Pagenstecher). Additional investigation is required to prove the existence of *C. vitis* (Nalepa), the grape rust mite, in Cyprus.

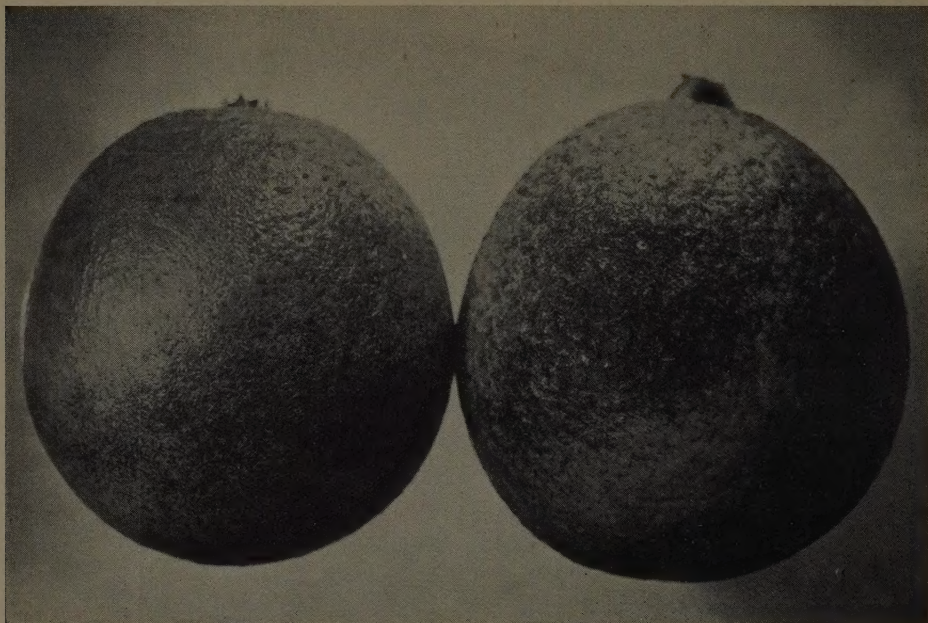


Figure 2. Injury to oranges caused by the citrus rust mite, *Phyllocoptruta oleivora* (Ashmead).

a 5-acre field almost all plants were destroyed soon after the first picking of the fruit. This mite has also been observed to damage potato plants. On the latter chlorosis was pronounced and was followed by bronzing but the plants were not killed. *Vasates lycopersici* and *Tetranychus telarius* (Linnaeus) may be considered the most important mite pests of tomato in Cyprus.

Insufficiently determined species:

28. *Aceria* sp. possibly *A. salviae* Nalepa; collected on *Salvia verbenaca*.
29. *Aceria* sp., collected on leaves of *Cynara scolymus*.
30. *Aceria* sp., collected on distorted blossoms of *Plantago albicans*.
31. *Aceria* sp., collected from galls on twigs of *Prunus amygdalus*.
32. *Eriophyes* sp., collected on leaves of *Crataegus azarolus*.
33. *Oxypleurites* sp., collected on leaves of *Acer obtusifolium*.

Phytoseiidae

The following two predatory species have been collected:

34. *Typhlodromus rhenanus* (Oudemans), collected on hollyhock infested with *Tetranychus* sp., in 1955, and on lemon twigs heavily infested with *Aceria sheldoni* (Ewing) in 1957.
35. *Typhlodromus tiliae* Oudemans, collected on lemon leaves in 1955.

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Appendix: CROP HOSTS OF MITES IN CYPRUS^a

Almond	<i>Aceria</i> sp.	Cereals	<i>Penthaleus major</i> (Dugès) *
	<i>Bryobia praetiosa</i> Koch complex *	Cherry	<i>Eotetranychus pruni</i> (Oudemans)
Apple	<i>Bryobia praetiosa</i> Koch complex *	Citrus	<i>Aceria sheldoni</i> (Ewing) *
	<i>Cenopalpus lanceolatisetae</i> (Attiah)		<i>Brevipalpus californicus</i> (Banks)
	<i>C. pulcher</i> (C. & F.) *		<i>B. obovatus</i> Donnadieu
	<i>Eotetranychus pruni</i> (Oudemans)		<i>Eutetranychus orientalis</i> (Klein) *
	<i>Eriophyes pyri</i> (Pagenstecher)		<i>Phyllocoptruta oleivora</i> (Ashmead) *
	<i>Tetranychus telarius</i> (L.) complex *	Fig	<i>Tydeus</i> sp.
	<i>Tydeus</i> sp.		<i>Eutetranychus hirsti</i> Pritchard & Baker
Carnations	<i>Aceria georgiouii</i> Keifer		<i>Eutetranychus orientalis</i> (Klein)

^a Asterisk indicates heavy infestations on record.

Grape	<i>Eriophyes vitis</i> (Pagenstecher) *	Potato	<i>Aceria lycopersici</i> (Wolfenstein)
	<i>Brevipalpus obovatus</i> Donnadieu		<i>Vasates lycopersici</i> (Masse)
Hazelnut	<i>Phytoptus avellanae</i> Nalepa *	Quince	<i>Cenopalpus pulcher</i> (C. & F.)
Loquat	<i>Cenopalpus pulcher</i> (C. & F.)	Strawberry	<i>Tetranychus telarius</i> (L.) complex
Olive	<i>Aceria olea</i> (Nalepa) *	Tomato	<i>Aceria lycopersici</i> (Wolfenstein)
Pear	<i>Bryobia praetiosa</i> Koch complex		<i>Vasates lycopersici</i> (Masse) *
<i>Pistacia</i>	<i>Aceria</i> sp. (?) <i>pistaciae</i> (Nalepa) *		<i>Tetranychus telarius</i> (L.) complex *
<i>terebinthus</i>			
Plum	<i>Bryobia praetiosa</i> Koch complex *	Walnut	<i>Aceria erinea</i> (Nalepa)
	<i>Tetranychus telarius</i> (L.) complex *	Watermelon	<i>Tetranychus telarius</i> (L.) complex *
	<i>Tydeus</i> sp.		
Pomegranate	<i>Aceria granati</i> (C. & M.) *	White beans	<i>Tetranychus telarius</i> (L.) complex *

Thread Blight Disease of Black Pepper in Puerto Rico¹

T. Theis, L. Calpouzos, L. Gregory and N. Almeyda, Federal Experiment Station, Agricultural Research Service, United States Department of Agriculture, Mayaguez

A thread blight disease of black pepper (*Piper nigrum*) occurred for two successive years in experimental plantings in the foothills near Mayaguez, Puerto Rico. This disease is common in the tropics and has been shown to infect many hosts (2). This, or a similar disease, has been reported by Steinmann (6) as causing serious damage to black pepper in Java. In Puerto Rico, the disease has produced a great deal of defoliation, some fruit drop, and unless controlled, could be harmful to production.

The causal fungus was identified as *Pellicularia koleroga* Cooke,² which is also commonly found parasitizing coffee (*Coffea arabica*), and has been reported (1) to attack other plant genera as well. *P. koleroga* is prevalent on coffee in Puerto Rico (4), and abundant infection was observed during 1958 in plantations of this crop in the vicinity of the black pepper plantings.

Symptoms of the disease on black pepper are similar to those on coffee. Threads of the fungus mycelium are readily apparent on stems (Figure 1A) but this mycelial growth does not appear to be harmful. When the threads reach a leaf, however, a thin white web of mycelium develops and covers the undersurface of the leaf. As infection proceeds, the color of the mycelium on the leaf assumes a gold cast, the mat becomes parchment-like, and the leaves blacken and die (Figure 1B). Dead leaves may adhere to the plant by the mycelial threads but they do not appear to do so as frequently as with coffee (Figure 1E). The diseased leaves usually abscise and adhere to other leaves or fruit, thus spreading the infection. Infected spikes shrivel and may abscise (Figures 1C and 1D) but they are not very common. The greatest damage to the

black pepper plants seems to be that caused by extensive defoliation.

The disease was most prevalent on large black pepper plants with abundant vegetative growth located in densely shaded areas. Plants in full sunlight were also infected, as was reported from Java (6). This suggests that removal of superfluous shade would probably be of aid in retard-

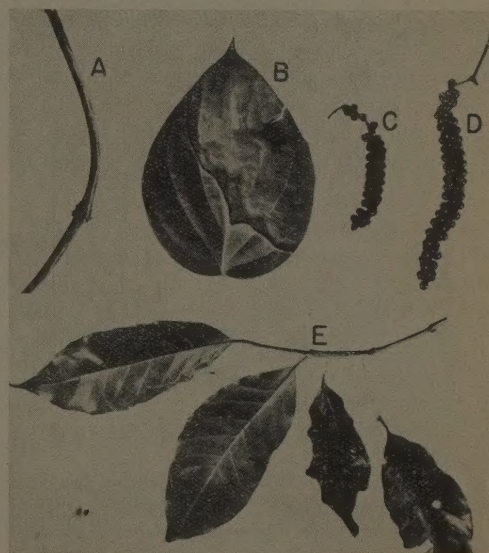


Figure 1. *Pellicularia koleroga* on black pepper and coffee. A. Thread of mycelium on black pepper. B. Infected black pepper leaf. C. Diseased spike of black pepper. D. Healthy spike of black pepper. E. Infected coffee leaves adhering to stem by mycelial threads.

ing development of the disease but could not be counted on for control.

The amount of disease in the black pepper plots varied seasonally. The outbreak in 1958 first became evident in the latter part of May, when a few small scattered infections were ob-

¹ The investigations reported were carried out in co-operation with Tropical Products, Inc., Mayaguez, Puerto Rico.

² Identified by J. A. Stevenson and P. L. Lentz, Mycology and Plant Disease Reporting Section, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.

Plant Quarantine Announcements

FRANCE (ALGERIA)

Order of 16 April 1959, published in *Recueil des actes administratifs*, Vol. 2, No. 34 of 24 April 1959, amends the Order of 19 December 1946 with regard to the importation of grapevine plants and cuttings.

Grapevine plants and cuttings may be imported only from France and they must be accompanied by a phytosanitary certificate in the form included in the International Plant Protection Convention of 1951. This certificate must be issued by an officer of the *Institut des vins de consommation courante*, duly authorized by the *Service métropolitain de la protection des végétaux*, stating that the grapevine plants or cuttings are free from plant pests and diseases listed under Article 1 of the Order of 8 November 1945 as amended, and that they originate from a nursery which has been inspected by the *Institut des vins de consommation courante*, and the soil of

which is free from potato root eelworm (*Heterodera rostochiensis*).

MAURITIUS

Proclamation No. 10 of 30 April 1959, published in the *Legal Supplement to the Government Gazette of the Colony of Mauritius*, No. 25 of 9 May 1959, prescribes conditions under which live plants may be imported from Madagascar into Mauritius. Importation of plants and parts thereof (including fresh fruit but not seeds) is prohibited, unless they are accompanied by a certificate, signed by a representative of the Chamber of Commerce of Tamatave or by an officer authorized by *La Section de défense des cultures et du contrôle phytosanitaire de Madagascar*, indicating that such plants and parts thereof have been fumigated at the *Station de désinfection de Tamatave*.

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